[The Glastonbury Thorn.]

## THE HAWTHORN.

Mr. Loudon, in his 'Arboretum,' confesses himself an enthusiastic admirer of the 'Cratægus' genus, and asks if any other could afford so many resources if a man were exiled to an estate with permission to choose only one genus of ligneous plants to form all his plantations, shrubberies, orchards, and flower-gardens? The most complete collection of the genus is in the arboretum of the Messrs. Loddiges at Hackney, which contains eighty sorts. At Somerford Hall, Staffordshire, there is a collection nearly as complete, made by General Monckton, a great admirer of the genus. The blossoms of each species and variety are generally in great profusion, and in most kinds are particularly fragrant. The fruit varies greatly in size and colour. In one species it is as small as a grain of mustard-seed, while the Mexican thorn bears yellow fruit as large as a golden pippin. The fruit of the azarola thorn is eaten in Italy, and that of another kind is sold in the markets of Montpellier. The flowers of the common brier-rose are distinguished by the same characteristics as the hawthorn-blossom, and the thorn genus is closely allied to the Rosaceæ and to the apple-tree. Some of our cultivated fruits have almost as humble an origin as the common haw of the hedges. One species of thorn is evergreen, and is often seen planted against the walls of houses, which it enlivens in autumn by its scarlet berries, and in winter by its perennial foliage.

The common hawthorn (white-thorn, May, or May-bush) is as redolent of poetical associations in England as the rose in the East. It is connected with the festivals of old English rural life, with May-day celebrations and dances round the Maypole, and all open-hearted pleasures of merry England in other times. A floral holiday betokens a poetical taste for nature and a freedom from griping and sordid cares, which, looking back upon the times when such days were celebrated, seems to give them a tinge of the golden age. We borrowed the May-day games from the Romans, who, as well as the Greeks, honoured the May-blossom in their floral celebrations. There are about twenty-nine varieties of hawthorn, and the species grows wild in every part of Europe. In France it is often called *l'épine noble*, from the belief that it furnished the crown of thorns planted on the brow of our Saviour. The spine, or thorn, often disappears by cultivation, as it has done in the pear-tree, which, in its wild state, is armed with thorns. Mr. Loudon says,—"In the environs of London we have observed the scarlet-flowered variety repeatedly in hedges, and also varieties with variegated leaves, with woolly fruit, with yellow fruit, and with pendulous shoots. As to varieties in the leaves, they are endless; and the same may be said of the size and of the hardness or fleshiness of the fruit." The reason is, that many millions of plants have been raised from seed in nurseries, and those which evinced any peculiarity have been kept apart and propagated by grafting. The varieties with scarlet or pink flowers are very beautiful objects on a lawn. There is a variety with red petals and white claws; a later variety has the petals wholly red, and

the flowers very large; and another, not often seen, has double flowers of scarlet. The variety which bears double white flowers is very beautiful, and the petals in fading become tinged with a delicate pink hue. The Glastonbury or early-flowering thorn is another variety, and is remarkable for the season at which its blossoms are produced, and for the legend connected with that circumstance. The story was, according to the monks of Glastonbury Abbey, that Joseph of Arimathea visited this country for the purpose of converting the inhabitants; and at Glastonbury, as a proof of the divine authority of his mission, he planted his staff into the ground, which immediately burst forth into branch and blossom. The blossoming of the tree on Christmas-day was regarded as a confirmation of the legend. The old thorn is said to have been destroyed by the Puritans, but a descendant remains. In 1833 Mr. Loudon received a branch from it, gathered on the 1st of December, which bore both blossoms and ripe fruit, and his correspondent stated that it would flower again in May. In the following year Mr. Loudon received a branch of the Glastonbury thorn, gathered in the Botanic Garden at Oxford, which displayed fully expanded blossoms and ripe fruit. Mr. Loudon says that the trees of this species in the gardens of the Horticultural Society and at Messrs. Loddiges' flower sometimes in December, and sometimes not until March or April.

The hawthorn is said to have been used by the Romans in England for forming hedges, and we know from books that it has been so employed for at least four hundred years. Plants of the hawthorn were collected in the woods, and hedges were made with the addition of the holly, the sloe, and some other species; but for a long period it would only be the land immediately surrounding the dwelling-place, and gardens, and plantations that would be enclosed with a live fence. Mr. Selby says that in Northumberland and other parts of England north of the Tees the greatest proportion of quickset-hedges have been planted within the last eighty years. Nurseries for quicksets were not established much before Evelyn's time, that is, about two hundred years ago. The immense number of enclosure acts within the last eighty years occasioned an enormous demand for quicksets, and the raising of them became one of the largest branches of employment in a country nursery; and though the demand is not so extensive as it once was, Mr. Loudon states that it continues greater and more steady than for any other plant of the nursery. Quicksets are produced from seed, which vegetates in its second year. In the first and second years after they appear they are planted in rows, and after remaining two, or perhaps three years, they are ready for planting in hedgerows for a future fence. It is to its hedges that England is indebted for much of its cultivated and sheltered appearance, and perhaps, to some extent, the number of its small birds. The scientific agriculturists of the present day are declaring war against lofty hedges, which occupy too much room and obstruct the circulation of air, and the plan is to cut them down to the height of about four feet. Even these are more pleasing than the stone 'hedges' of Derbyshire, though they also agree well with the scenery in which their use is a local necessity. The colonists of New Zealand have introduced the hawthorn for fences into that distant region.

The hawthorn must not, however, be exclusively considered as a plant for hedges. It is entitled to be considered as a tree of the second or third rank. They are found with trunks varying in height from four to upwards of ten feet, and a total height of forty-five feet, some of which are growing wild, and others have been nurtured by cultivation. An old thorn at Duddingstone, near Edinburgh, which was measured in 1836, at the request of Mr. Loudon, was forty-three feet high; the diameter of the space over which the branches extended was forty-four feet; the circumference at three feet above the root, nine feet and a half; and a little way above the root, ten feet and a half. Mr. Selby, in his recent work, says that at Jardine Hall, Dumfriesshire, there is at present a thorn, planted in 1708, and the circle overspread by its branches is nearly fifty feet. Its form is elegant and picturesque, with falling or slightly pendulous branches. Mr. Jesse says that the old thorns in Bushy Park are most probably above two centuries old. He points out a remarkable property in the thorn. "As they increase in age they have the property of separating themselves into different stems, some having four or five, and even six, which, as they separate, become regularly barked round, forming to appearance so many distinct trees closely planted together, except that they all meet at the 'butt' of the tree. Some of the thorns are now undergoing the process of separation, having already thrown out one stem; while in other parts they are deeply indented with seams down the whole stem." The hawthorn requires a good soil for the full development of its size. The wood is hard and firm, close in grain, and susceptible of a fine polish. It is used for cogs in mill-wheels, for flails, handles for hammers, mallets, &c. It makes excellent fuel, and burns as well when green as in a dry state.

Some controversy has been maintained as to the claims of the hawthorn as a picturesque tree; but even if it could be pronounced the reverse, the natural associations connected with it as one of the blooming heralds of summer, and other sentiments which it awakens, would render it a favourite. Gilpin alleged that it was a round, heavy, and matted bush, and that its blossoms were too profuse. This may often be the case. But Sir T. Dick Lauder observes that "the hawthorn is not only an interesting object by itself, but produces a most interesting combination or contrast, as things may be, when grouped with other trees. We have seen it," he says, "hanging over rocks, with deep shadows under its foliage; or shooting from their sides in the most fantastic forms, as if to gaze at its image in the deep pool below. We have seen it contrasting its tender green and its delicate leaves with the brighter and deeper masses of the holly and the alder. We have seen it growing under the shelter, though not under the shade, of some stately oak, embodying the idea of beauty protected by strength. Our eyes have often caught the motion of the busy mill-wheel, over which its blossoms were clustering. We have seen it growing on the green of the village-school, perhaps the only thing remaining to be recognised when the schoolboy returns as the man. We have seen its aged boughs overshadowing one-half of some peaceful cottage; its foliage half concealing the window, whence the sounds of happy content and cheerful mirth came forth." Therefore, for its associations alone, it cannot be regarded without emotion. Mr. Loudon suggests that a greater variety of the genus Cratægus should be introduced; "and were it," he says, "only the practice, in planting hedges along the sides of the public highways, to introduce here and there as standards thirty or forty sorts, which might be raised from seed, the ornament to the country would be such as those only can form an idea of who have seen the collections at White Knights, near Reading, when the trees are in flower and when they are in fruit." We believe, however, the road-makers would protest against such a practice. Mr. Selby speaks of the fine effect produced by large and ancient thorns in the ravines near Pease Bridge, on the great northern road. Here they are mixed "with a few detached and gnarled oaks, and the vacant spaces enriched with the golden blossoms of the

whin." In the northern district in which he resides, the hawthorn, he says, is one of the greatest accessories to the beauty of the denes and ravines.

## PLANTS USED IN DYEING BLUE.

The ingredients for producing a blue dye have, like many others of the materials of manufacture, been the subject of much bitter discussion and much hostile legislation, according as the growers of one kind gained the ascendency over those of the other. Woad and indigo are the materials here alluded to; which, together with orchil or archil, constitute the three principal plants for imparting a blue or purple dye to woven fabrics.

Woad is a plant cultivated in Lincolnshire and some other parts of England, as well as on the Continent, for the sake of the leaves, which, after being properly manufactured, are used as an ingredient in dyeing blue, and as a basis for black. It is a biennial plant, with a strong thickish fibrous root, which penetrates deep into the soil. The flowers are yellow; and the stem, which rises to four or five feet in height, is smooth. The plant is sown in spring, after a double tillage in autumn. Three or four crops are obtained in a year; the first when the stems begin to grow yellow, and the flowers about to appear; the others at successive intervals of six weeks or more, according to the climate and heat of the season.

The method of procedure, when the leaves have been gathered, is nearly the same in England and in France. Astruc describes the French system to be the following:—As soon as the leaves are gathered, they are carried directly to a mill, somewhat resembling an oil or tan mill. Here they are ground into a paste, which is then laid in heaps, pressed close and smooth. A blackish crust forms on the outside, which is kept free from cracks, as the quality of the plant is thereby better preserved. After lying for about a fortnight the heaps are opened, the crust rubbed and mixed with the interior portions, and the whole formed into oval balls, which are pressed close and solid in wooden moulds. These are dried upon hurdles; in the sun, they turn black on the outside; in a close place yellowish, especially if the weather be damp; and the dealers generally prefer the first kind. The good balls are distinguished by their being weighty, of an agreeable smell, and, when rubbed, of a violet colour within. For the use of the dyer, these balls require a further preparation. They are beaten with wooden mallets, on a brick or stone floor, into a gross powder, which is heaped up in the middle of the room to the height of four feet; a space being left for passing round the sides. The powder, moistened with water, ferments, and throws out a thick fœtid fume. It is shovelled backwards and forwards, and moistened, every day for nearly a fortnight; after which it is stirred less frequently, without watering, and at length made into a heap for the dyer. The powder thus prepared gives only brownish tints, but on diluting the powder with boiling-water, and allowing it to ferment for a time with a little newly-slaked lime, a blue froth rises to the surface, and the liquid becomes fitted to impart a green colour, which changes to blue on exposure to the air.

Beckmann has collected some curious illustrations of the opposition which the growers of woad or pastel (another name for the plant) in different parts of Europe made to the introduction of indigo as a blue dye. The ancient Britons are supposed to have employed woad in dyeing their skins; and many evidences exist to show that the same substance was generally employed in many countries of Europe in very early times. The growers of woad prevailed on several governments to prohibit the use of indigo. In Germany, an imperial edict was published in 1654, prohibiting the use of indigo, or 'devil's dye,' and directing great care to be taken to prevent its clandestine importation, "because," says the edict, "the trade in woad is lessened, dyed articles injured, and money carried out of the country." The magistrates of Nuremberg went further, and compelled the dyers of that city to take an oath once a year not to use indigo, which practice was continued down to a late period. In 1598, upon an earnest representation of the States of Languedoc, at the solicitation of the woad-growers, the use of indigo was prohibited in that province; and it was not till 1737 that the dyers of France were left at liberty to dye with such articles, and in such a way, as they pleased. Mr. M'Culloch pointedly remarks, "Let not those who may happen to throw their eyes over this paragraph smile at the ignorance of our ancestors,—*mutato nomine, de te fabula narratur*. How much opposition is made at this moment to the importation of many important articles, for no better reasons than were alleged in the sixteenth century against the importation of indigo!" The character now given to woad as a dye is this,—that it is at the present day seldom employed without a mixture of indigo. By itself it is incapable of giving a bright and deep blue colour, but the colour which it does give is very durable.

*Indigo.*—This valuable substance is obtained from a tropical plant called *Indigofera*, cultivated in the East Indies, and to a much smaller extent in America. The Indian variety (which is that from which our indigo is chiefly produced) has pinnate leaves, and a slight ligneous stem, and, when successfully cultivated, rises to a height of four or five feet. The leaves, as in the case of woad, constitute the part which yields the colouring-matter.

The indigo-plant requires a rich, smooth, and well-tilled soil. The seed, which in figure and colour resembles gunpowder, is sown in little furrows two or three inches deep, at the distance of a foot apart; the sowing season being generally the spring. Moisture causes the plant to shoot above the surface in three or four days, and continual attention is then required to pluck up the weeds, which would otherwise choke the plant. It is ripe at the end of two months. When it begins to flower, it is cut with pruning-knives; and again at the end of every six weeks. It lasts about two years, after which time it degenerates, and is then plucked up and planted afresh. The culture is very precarious, not only in so far as respects the growth of the plant from year to year, but also as regards the quantity and quality of the drug which the same amount of plant will afford even in the same season. Sometimes the plant becomes dry, and is destroyed by an insect frequently found in it; at other times the leaves, which are the valuable part of the plant, are devoured in the space of twenty-four hours by caterpillars. Hence a saying has arisen, that very frequently "an indigo-planter goes to bed rich, and rises in the morning totally ruined."

In order that the dyeing ingredient may be extracted from the leaves, the latter are, as soon as gathered, thrown into a large vessel filled with water; care being taken not to lose or scatter a kind of bloom or farina which is found on the leaves, and which constitutes a great part of their value. The leaves ferment during twenty-four hours in the vessel of water, from which the liquid is then drawn off into a second vessel. This liquid is found to be impregnated with a very subtile earth, which alone constitutes the dregs or blue substance that is the object of the process. This earth is combined with a useless salt which the plant had yielded; and it is necessary to separate the two before

the earth can be recovered in its pure state. The separation is effected by violently agitating the liquid; but if this be not carefully effected, either part of the indigo is wasted, or its quality becomes deteriorated, and it obtains the name of 'burnt indigo.' When it is perceived that the coloured particles collect by separating from the rest of the liquor, the whole is left stationary, in order to allow the blue dregs to be precipitated. The water is then drawn off, and the sediment, a kind of thick muddy liquor, is transferred to a third vessel, where it is still further separated from water. It is next strained through cloths, and, when so thoroughly drained as to become a thick paste, it is put into chests, where it is allowed for a period of three months to part gradually with all its moisture. It then constitutes the indigo of commerce.

Good indigo is known by its lightness, or small specific gravity, indicating the absence of earthy impurities; by the mass not readily parting with its colouring-matter when tested by drawing a streak with it over a white surface; and by the purity of the colour itself. The Bengal indigo is the best kind, and is divided into many qualities according to the purity of its colour; such as *fine blue, ordinary blue, fine purple, purple and violet, ordinary purple and violet, dull blue, inferior blue and violet, strong copper*, and *ordinary copper*.

The quantity and value of the indigo used in this country would surprise many readers. There have been as much as eight million pounds imported into Great Britain in one year, of which about three millions were retained for home consumption. The price fluctuates considerably; the common kinds varying from two to six shillings, and the best from six to fifteen shillings per pound, at different times. Mr. M'Culloch states, "The consumption of indigo has varied but little in this country during the last dozen years (previously to 1834), having been, at an average of that period, about two million three hundred thousand pounds a year. This stationary demand, notwithstanding the fall in the price of the drug and the increase of population, is principally to be ascribed to the decreasing use of blue cloth, in the dyeing of which it is principally made use of. Its consumption in France is about as great as in Britain. Besides the exports to Great Britain, France, and the United States, a good deal of Bengal indigo is exported to the ports on the Persian Gulf, whence it finds its way to Southern Russia. It is singular that it is not used by the Chinese, with whom blue is a favourite colour."

The action of an indigo-dye is very remarkable. In its real state as indigo it is insoluble in water, and only becomes soluble when it is so chemically changed as to produce a *yellow* dye, and to combine with lime or potash. But any woven fabric which has been thus dyed yellow, begins to turn green immediately on exposure to the atmosphere, and the green gradually changes to the blue for which indigo is so much valued. It appears now to have become almost an indispensable aid to the dyer; and it is said that one pound of indigo leaves will yield thirty times as much colouring-matter as an equal weight of woad, the quality too being superior.

*Orchil* or *Archil*.—This dye-drug might perhaps about as fittingly be classed among the reds as the blues; since it is employed for tints in which both of those are combined, such as violet and lilac. The plant itself is a whitish lichen, called by the several names of *orchil, archil, orchilla, orchella, orseille, oricello, orcella*, and cultivated chiefly in the Canary and Cape de Verd Islands, Barbary, and the Levant. It is a moss which grows upright, partly in single, partly in double stems, which are about two inches in height. When it is old, these stems are crowned with a button, sometimes round and sometimes of a flat form. Those who prepare the moss for the use of the dyer grind it betwixt stones, so as to bruise it thoroughly without reducing it to powder, and then mix it with quicklime and other substances. Alkalies extract from it a colour which is first violet, then purplish red, and then blue.

The use of orchil as a dye has been traced back to very early times. It is supposed to be the same plant as was stated by Pliny to grow on the island of Crete, and to have been used for dyeing wool. He states that the colour which it gave, when fresh, was so beautiful, that it excelled the still more ancient purple or violet dye; and that the dyers used it as a ground or first tint for their purple dyes. Orchil is still collected in the Greek islands, where it appears to have been more or less used from the time of the classical writers. Beckmann supposes that the inhabitants of western Europe learned the use of orchil from the Greeks; and that the Florentines introduced it as a dye-stuff into Europe at the beginning of the fourteenth century. He observes that among the oldest and principal Florentine families is that known under the name of the Oricellarii, Rucellarii, or Rucellai; one of whom, in the year 1300, carried on a great trade in the Levant, and, returning with great wealth to Florence, first made known in western Europe the art of dyeing with orchil; and from this useful invention the family received the name of Oricellarii, from which, in process of time, was formed Rucellai. After that period the Italians procured the plant from the Levant for themselves, and afterwards for all Europe. But since the discovery of the Canary Islands, about the end of the fourteenth or the beginning of the fifteenth century, the greater part of the substance has been procured from them. In the islands of Canary, Teneriffe and Palma this moss belongs to the crown; and there exists a record that in 1730 it was let or farmed by the king of Spain for 1500 piastres. In the rest of the islands it belongs to private proprietors, who cause it to be collected on their own account. About the year 1730 the captain of an English vessel brought a bag of this plant from the Cape de Verd Islands to Santa Cruz, by way of trial; and, discovering his secret to some Spanish and Genoese merchants, they fitted out a ship in the following year for those islands, whence they brought large quantities of the plant.

The dyers do not purchase raw orchil, but a paste made from it, which the French call "orseille en pâte." The preparation of this paste was for a long time kept secret by the Florentines; but it gradually spread into other countries. The dyers seldom use this drug by itself, on account of its costliness and want of durability; but they chiefly employ it to impart a bloom to other colours, by passing the dyed cloth or silk through hot water lightly impregnated with the orchil. The watery solution of orchil applied to cold marble penetrates it, communicating a beautiful violet colour, or a blue bordering on purple, which resists the air much longer than the orchil colours applied to other substances. Dufay says that he has seen marble tinged with this colour preserve it without alteration at the end of two years.

There is a variety of orchil called *cudbear*, produced from the lichen *tartareus*, by a process analogous to that employed with orchil. Dr. Thomson has the following remark concerning this substance:—"The manufacture of this dye-stuff was begun about the year 1777, at Leith, by Mr. Mackintosh and Dr. Cuthbert Gordon, from which last the British name of *Cudbear* (originally *Cuthbert*) is derived. Leith was found an improper place for the manufacture; but Mr. Mackintosh transferred it to Glasgow, and manufactured cudbear during the rest of his life with success. He left

it to his son Charles Mackintosh, Esq., who still carries it on. The lichens used were at first collected in the Highlands of Scotland; but the rocks of that country being stripped of their covering, the manufacturers had recourse to Sweden and Norway, and likewise to Sardinia, from which prodigious quantities of the lichens were brought. There is said also to be a manufactory of cudbear at Liverpool."

[Convents of the Meteor Monks.]

## THE "METEOR" MONKS OF THESSALY.

The buildings represented in the above engraving are Greek convents, inhabited by Carthusian monks, who, in order to remove themselves as much as possible from the vanities and temptations of the world, have placed their dwellings on some of the highest rocks which the mountainous region of Albania affords. They are principally in the immediate neighbourhood of Mount Pindus, the highest of the mountains forming the Albanian chain, and which commands an extensive view of hills, and woods, and plains, and rivers, every spot of which is consecrated by some glorious event in the history of ancient Greece, or by some poetic allusion which the classic student recalls with fervour as he gazes on the prospect. "Before us in the extreme distance," says Mr. Turner, who visited Mount Pindus in 1819, "lay Olympus to the north-east; beneath it was Thermopylæ, and to the right Parnassus. On the plain before me winded two insignificant streams, once the Achelous and the Peneus. In my life I was never so enchanted as by the vast extent of prospect that I enjoyed from this justly celebrated mountain." *

* 'Journal of a Tour in the Levant,' by W. Turner, Esq., 1820.

We must acknowledge a situation like this well chosen by these solitary Carthusians, who, giving themselves little heed for their present wants, allow their thoughts to dwell only on the history of the past, and on their prospects of the future. As the convents lie out of the beaten track, but few travellers are aware of their existence; and they are therefore but seldom visited by strangers. To him, however, who has wandered to their vicinity, their appearance may well occasion some surprise; for, perched on the highest points of insulated rocks, they appear to have been transported thither by angels (like the far-famed House of Our Lady at Loretto), or to have fallen from the clouds like meteors, as it seems almost impossible they could ever otherwise have gained their footing. It is from this latter supposition that they are known among the Albanians as the "Meteors." There are about nine or ten of these monasteries near Mount Pindus, and the monks who inhabit them, when they leave them to procure provisions or other necessaries, have to be lowered to the ground by a basket and rope, and raised again by the same means, except in one or two instances, where a staircase has been made in the interior of the rock, to the entrance of which (at some height from the ground) access may be gained by ladders furnished by monks in the interior. M. Dupré,

a French artist, who published a collection of sketches made during a visit to Greece in 1819, has given a representation of several of these convents (of one of which we have availed ourselves in our engraving), and has also described a visit made to it by himself and fellow-travellers, which we in part extract, as showing the mode in which admission is gained.

Having by means of great shouting made the monks aware of their intention to pay them a visit, they at length perceived some preparations being made in a balcony of the convent, which overhung the rock, for their ascent. A bag or net was slowly let down to them by a strong cord, in which each of the party was to make a separate ascent, so that were a large party to visit the place a considerable time must elapse before they were all housed. "Mr. Hyett risked himself the first. He placed himself, well doubled up, in the net, and was raised in a few minutes to a height of a hundred and thirty feet, by means of a capstan in the balcony, worked by a dozen monks. In the mean time Mr. Hay had mounted a ladder, and thence, by a rope-ladder furnished by the monks, had gained the entrance to a staircase which led to the convent, excavated in the interior of the rock. The apparatus having re-descended, and the capstan being about to be again worked, I entered the net and soon found myself suspended more than a hundred feet from the ground. The reboundings of the net against the rocks gave me a few shocks, and made me tremble a little, but at length I gained a footing at the summit, and was not sorry to do so. They showed us the chapel, of which the walls and vaults were painted and gilt, a commodious cloister, and numerous cells." M. Dupré describes the monks as having pale and inanimate countenances, and speaking but seldom.

We are not aware whether these monasteries still exist. During the Greek revolution many of the convents were deserted by their inhabitants, and others were destroyed by the Turks; and it is probable these may have suffered. The "Meteors" took a distinguished part in the revolution: they carried the Cross into the midst of battle, and many of them became martyrs to the cause they advocated.

## HORSES IN THE EAST, AND THEIR TREATMENT.

[Concluded from page 448.]

THE Arab horses are mostly small, in height seldom exceeding fourteen hands; but few are ill-formed, and they have all certain characteristic beauties which distinguish their breed from any other. The Arabs count five noble breeds, descended, as they believe, from the five favourite mares of Mohammed. But these five principal races diverge into infinite ramifications; for any mare particularly swift and handsome may give origin to a new breed, the descendants of which are called after her. On the birth of a colt of noble breed it is usual to assemble some witnesses, and to write an account of the colt's distinctive marks, with the name of its sire and dam. These genealogical tables never ascend to the grand-dam, because it is presumed that every Arab of the tribe knows by tradition the purity of the whole breed. Nor is it always necessary to have such certificates; for many horses and mares are of such illustrious descent, that thousands might attest the purity of their blood. The pedigree is often put into a small piece of leather covered with a waxed cloth, and hung by a leathern thong around the horse's neck.

The Arabs keep their horses in the open air all the year round, not (like the Turkmans) tying them up in the tent, even in the rainy season. Although thus exposed to the inclemency of the weather at all seasons, and with very little attention paid to its health, the Arab horse is seldom ill. From the time that a colt is first mounted (which is after its second year), the saddle is scarcely ever off its back: in winter a sackcloth is thrown over the saddle, but in summer the horse stands exposed to the mid-day sun. Those Arabs who have no saddles ride upon a stuffed sheep-skin, and without stirrups: they all ride without bridles, guiding the horse with a halter. In fact, the extreme good temper and entire freedom from vice of a horse which is and which feels itself treated rather as the friend than the slave of man, renders a bridle needless. The Arab is ignorant of the frauds of the European jockey, and, although in their dealings with strangers they are apt to play false as to the pedigree, they may generally be trusted as to the actual qualities of the horse they sell. Few of them know how to tell the age of a horse by examining its teeth. Burckhardt relates that, when he once looked into the mouth of a mare, it was at first apprehended by the Arabs present that he was practising some secret charm; and when the owner heard that by such inspection the age of the animal might be ascertained, he seemed astonished, and wished that his own age should be told by the examination of his teeth.

The Arabs believe that some horses are predestined to evil accidents; and, like the Osmanlis, they think that the owners of other horses must sooner or later experience certain misfortunes, which are indicated by particular marks on the horses' bodies. There are above twenty evil marks of this kind, which have the effect of depreciating the value of the horse by two-thirds or more.

In Syria, as elsewhere in Western Asia, the horses universally live on barley and chopped straw. They are regularly fed morning and evening, and for the most part eat nothing in the interim. In the stable the provender is laid before them in troughs; in the fields it is put into hair bags, which are fastened in such a manner to the horse's head, that he can feed as he stands. In the spring season the horses are fed for forty or fifty days with green barley, cut as soon as the corn begins to ear. This is termed "tying down to grass," during which time the animals remain constantly exposed in the open air, and for the first eight or ten days are neither curried, mounted, nor even led about. After this they are dressed as usual, and rode out gently, but are never much worked in the grass season. Some feed their horses with the cut-down corn in their stable-yards; but it is considered better to tie them down in the barley-field, where they are confined to a certain circuit by a long tether. This grazing is considered of great service to the health of the horses, and gives a beautiful gloss to their skin. They are at all times littered with the refuse of their provender, mixed with their own dung dried in the sun.

The reader will perceive that there is some difference between this treatment and that which the Arab horses receive. Some Arabian tribes, indeed, give no corn at all to their horses, which feed upon the herbs of the desert, and drink plenty of camel's milk, and are besides nourished with a paste made of dates and water. Even flesh, raw as well as boiled, is given to the horses in some quarters, together with the fragments of their owners' meals. An inhabitant of Hamah assured Burckhardt that he had often given his horses roasted meat before the commencement of a fatiguing journey, that they might be the better able to endure it; and the same person, fearing lest the governor should take from him his favourite horse, fed him for a fortnight exclusively upon roasted pork, which so excited its spirit and mettle, that it became absolutely

unmanageable, and no longer an object of desire to the governor.

Another difference is, that the Arabs never clean or rub their horses, whereas in Syria the better sort of horses are dressed every morning.

Burckhardt contradicts the general opinion that Arabia is very rich in horses. He is confident that he is not by any means under the true estimate when he calculates the number of horses in Arabia, as bounded by Syria and the Euphrates, at fifty thousand—a number much inferior to what the same extent of ground would furnish in any other part of Asia or in Europe.

It has been already stated that the Osmanlis, contrarily to the Arabs, prefer horses to mares for riding. Entire horses are usually preferred; but persons advanced in years, especially among the Effendis, like geldings, which are not uncommon in the towns. The Syrian horses, *in common with other domestic animals of that climate*, partake of a certain gentleness of temper, and have such a disposition to become docile and familiar, that it is very rare indeed to find one completely vicious. The Arab horses are remarkably distinguished for this quality, owing, without doubt, in a great measure to the kind and humane manner in which they are reared, and ever after treated by their masters.

## MINOR USES OF STEAM.

When we speak—as we often speak, and with justice—of the gigantic power of steam, we in nearly all cases imply, if we do not mention, the steam-engine as the immediate agent. When a mine is drained, a weight lifted, a ship propelled, a locomotive carriage moved, thread spun, cloth woven, pins made, &c., by steam, it is well to bear in mind that the working agent is in all these cases a complicated series of wheel-work, and that these wheels are set in motion by steam. The fly-wheel may be deemed a dividing line, separating the production of power from the consumption. It is nearly always to set a fly-wheel, or something analogous to it, in motion, that the steam is employed; and the power thus accumulated may be applied in an endless variety of ways.

There are, however, numerous modes in which steam becomes valuably applied in the arts, without any reference whatever to a steam-engine. The source of power in a steam-engine is the vast diminution of bulk which is brought about when steam is converted into water; but there are other properties in steam calculated to yield important results, results which we call "minor" only when compared with the marvellous effects of the steam-engine.

The warming of buildings is an important example of this kind, and depends on the vast quantity of heat accumulated in a given weight of water when in the state of steam. If we suppose an ounce of water to be converted into steam, then that steam contains as much heat as would raise an ounce of water to a temperature of one thousand degrees, if it were possible to retain the liquid form at such a temperature. The whole of this heat belongs to the steam in its gaseous or aëriform state, and is given out on the instant when the steam is condensed into water. Hence the efficacy of steam as an agent for heating buildings; for it can be conveyed from any part of a building to another part, in close tubes, carrying with it a reservoir of latent heat which can be liberated by simply condensing the steam into water. The steam, being generated in a boiler in any convenient part of the building, is carried in closed pipes to the apartments to be warmed, which pipes circulate round the apartments, and return again to the boiler. When the steam comes into contact with the cold iron pipes, it becomes condensed, and the latent heat passes into the iron, and thence into the air of the room; the water of the condensed steam flowing down into the boiler, again to be driven up in the form of steam; thus continuing the circuit as long as there is water in the boiler and fire to heat it. Mr. Russell states that, from experiments which he has made, he is induced to conclude that a room containing five hundred cubic feet of air, and exposing four hundred feet of steam-pipe surface, may be maintained at a temperature of twenty degrees above that of the air without—for instance, at sixty degrees in the inside of the room when the atmosphere is forty degrees without—for a space of twelve hours, by the evaporation of two gallons of water, and at the expense of about three pounds of coal. This would be for a close room, the air being unchanged; but after allowing for the ventilation necessary to an inhabited room, Mr. Russell gives the following as a sort of standard example: that a room thirty feet long, twenty feet wide, and ten feet high, in which is a steam-pipe surface of two thousand two hundred square feet, may be maintained at a temperature twenty degrees above that of the external air, for a space of twelve hours, and with sufficient ventilation for six persons, by the heat resulting from the steam of fourteen and a half gallons of water, heated by about eighty pounds of coal.

Many of our large public buildings are thus heated by steam. For hothouses and greenhouses the plan presents many advantages; for the warmth thus distributed is freed from those risks of injury to the vitality of the plants which accompany the old method of warming by hot-air flues, in which a dry contaminated air and an unequable temperature are apt to be produced. The warmth given out by the steam is of uniform intensity throughout the whole range of the hothouse, and one building, however long, may be warmed by one apparatus—an advantage by which one-third of the fuel is said to be saved. At the Duke of Northumberland's seat at Sion House, nearly one thousand feet in length of glass-houses are heated by one boiler. It has been found that, in the palm-house of the Royal Botanic Garden at Edinburgh, an octagonal structure sixty-feet in diameter and forty feet high, and presenting five thousand square feet of glass, the air within is kept at thirty degrees above the air without, by the heat of steam arising from water heated by two hundred and fifty pounds of coal in twenty-four hours.

Warming the water in baths, vats, tuns, and other vessels, is often very conveniently effected by steam, where the vessel is so placed as not to be conveniently heated by a fire beneath. The latent heat of steam is here shown in a remarkable manner; for if ten gallons of boiling water be converted into steam, and the steam be conveyed in a pipe to a bath or other vessel, it will raise one hundred and sixty-five gallons of water from 40° to 100°, and a warm-bath may be thus produced with an expenditure of eighteen pounds of coal. In many large factories the vessels for dyeing, steeping, washing, &c., the materials of manufacture, are heated in this way; and it is surprising to see how rapidly the heating is effected. The general way of arranging the apparatus is to pass the open end of the steam-pipe from the boiler directly into the water to be heated, so as at once to mix with it; the steam itself becomes water and gives its heat to the water or liquid in the vessel.

Sometimes the liquid in the vessel is not only heated, but made to boil, by the admission of steam. In many factories, such as dye-works, a great number of vessels are brought to a boiling state by the action of

one steam-pipe, which passes round the room, and is connected by short pipes with the various vessels. It often happens, however, that the liquid is of such a kind as must be kept free from mixing with the condensed steam; and in such a case a coil of steam-pipe is immersed in the liquid, which is then heated by the metallic surface just as the air of a steam-heated room. This is the method employed with so much advantage in sugar-refineries, where the sugar-pan, in which the crystallization of the sugar goes on, instead of being heated by means of an open fire, as used formerly to be the case, is heated by means of steam, contained either in a cavity below the bottom of the pan, or in a coil of pipe laid in the pan itself. As steam can be produced at various temperatures, according to the heat from which it arises, the pan can be thus heated to any required point, and kept at that temperature—an adjustment which is scarcely possible when the pan is heated over an open fire. Two important advantages often result in manufactures from this circumstance: viz., that thickened liquids, strong solutions, and any porous solid matter impregnated with fluid, may be evaporated and wholly separated from the fluid, without incurring the danger and suffering the deterioration resulting from direct application of the fire; and secondly, that liquids may be warmed, evaporated, and even boiled, in vessels of wood, which are for some purposes better than those made of metal.

The process of *drying* by steam is now very extensively adopted in various branches of manufacture; the great advantage being that the temperature can with so much facility be regulated. A steam-kiln for drying grain is an example of this kind, and is arranged in the following manner:—The grain is spread out on the iron floor of a large room, which is either perforated with a multitude of small holes, or is formed of a very fine grating. Immediately under the floor steam-pipes of six inches diameter lie parallel to each other at small intervals apart, and radiate heat directly to the floor and the grain; numerous large ventilators being provided for the escape of the vapour thus impregnated with moisture.

In the paper manufacture, in starching the yarns preparatory to canvas-weaving, in calico-printing, and numerous branches of manufacture, steam is employed to dry the material, which it does with astonishing efficacy and rapidity. In the modern process of making paper by machinery, the thin layer of pulp, when formed, passes over a cylinder heated from within by means of steam, and becomes by this means dried almost instantaneously; so that the pulp which enters the machine at one end comes out at the other, after the interval of a few minutes, in the form of dry paper. The starched yarns used by the weaver are similarly drawn over steam-heated cylinders or metallic boxes, by which the starch is dried the moment after it is laid on. In most applications of the kind, the mode of procedure is analogous to that here pointed out, the wet substance being drawn over the surface of a cylinder heated from within by means of steam.

The power of high-pressure steam to extract the gelatine from bones, which could not be effected at the ordinary boiling temperature, has been made the means of useful application in France and in this country, by obtaining nutriment from that which in ordinary circumstances is thrown away, or at least rejected from the kitchen. Dr. Papin, about a century and a half ago, was the first to propose this application of steam; he constructed a machine called a digester, and wrote an account of it, containing a description of its uses in "cookery, voyages at sea, confectionary, making of drinks, chemistry, and dyeing, with an account of the price a good big engine will cost, and of the profit it will afford." The following, from the index to his book, will show how far he proposed to carry his invention in aid of the culinary art:—"How meat may be kept on the fire three times as long as is necessary to make it ready, and yet it will not be spoiled—the same experiment made upon bones—how to boil mutton—how to boil beef—how to boil lamb—how to boil rabbits—how to boil pigeons—how to boil fish—how to boil pulse—how to make jelly, very cheap—glue for glasses—hartshorn turned like Parmesan cheese—a mackerel kept without salt—salt-water as good for nourishment as fresh-water—to make sweetmeats at a cheap rate and of a new taste—to make two sorts of drink with the same fruit—to make a new sort of wine—tinctures drawn in the hundredth part of the time usually required for them—new ways for distilling—how to hatch chickens—how to save the labour of grinding cochinelle—to dye with thick juices—to make horn and tortoiseshell soft for a great while," &c.

The principle on which all these marvels were produced was simply this:—As long as water is heated in contact with the atmosphere, it cannot become hotter (in our climate and at the surface of the earth) than about 212°. But if the water be confined in a very strong vessel, with no outlet for the steam, both water and steam will increase in temperature until the expansive force bursts the vessel, the expansive force increasing very rapidly with the increase of heat. If substances be immersed in the water or the steam thus powerfully heated, they may be acted on, especially if of animal origin, in a manner which ordinary boiling could never equal.

The modern "steam-kitchen," or steam-cooking apparatus, exhibits an application of steam by no means unworthy of attention. Here a boiler is so placed as to allow fire conveniently to act upon a vessel of water, and convert the water into steam; while the steam, thus created, is conveyed to various receptacles placed near it. A recess or hot-closet, fitted with shelves, is surrounded by a case, and between them steam circulates, by which the shelves themselves become heated; while steamers and warmers, kettles and saucepans, are brought within reach of the heating agent by pipes branching *ad libitum* from the boiler.

It would not be difficult to collect numerous other examples in which steam, chiefly by its heating power, is brought into valuable requisition—quite irrespective of that vast power which it exerts as a moving-force for machinery.

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*Tapioca.*—Starch is often combined with poisonous substances; and many anxious mothers will be surprised to hear that the mild, bland, demulcent tapioca is obtained from the root of the jatropha manihot, a plant indigenous to the Brazils, Guiana, and the West India Islands, which is one of the most active poisons known, causing death in a few minutes after it has been swallowed. The roots of this plant, which contain a great quantity of sap, are peeled and subjected to pressure in bags made of rushes. The juice thus forced out is so deadly a poison, that it is employed by the Indians as a poison for their arrows. On being allowed to stand, however, it soon deposits a white starch, which, when properly washed, is quite innocent. This starch is then dried in smoke, and afterwards passed through a sieve; and is the substance from which tapioca and the cassava bread of the Indians is prepared. The discovery of the process for separating this powder from the jatropha manihot has been of the greatest importance to the human race, since it enables us to obtain a most valuable article of food from a plant that is of a highly poisonous nature, but which contains an enormous quantity of nutritious matter; for it is asserted that one acre of manihot will afford nourishment for more persons than six acres of wheat.—*Dr. Truman on Food.*

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